PROC. ENTOMOL. SOC. WASH.
93(3), 1991, pp. 525–532

TWO NEW SPECIES OF *ELEODES* (COLEOPTERA: TENEBRIONIDAE) FROM MEXICAN CAVES

CHARLES A. TRIPLEHORN AND JAMES R. REDDELL

(CAT) Department of Entomology, The Ohio State University, Columbus, Ohio 43210; (JRR) Texas Memorial Museum, The University of Texas, Austin, Texas 78705.

Abstract.—Two new species, ***Eleodes* (*Caverneleodes*) *sprousei*** and ***E.* (*C.*) *rugosifrons***, are described from caves in Nuevo León and Tamaulipas and from caves in Coahuila and Nuevo León, respectively. A key to the five known species of the subgenus is presented.

Key Words: Tenebrionidae, *Eleodes,* cave biology, darkling beetles

The junior author has been collecting cave dwelling arthropods for many years and has contributed a vast amount of information on the fauna of that unique habitat. The following descriptions of two remarkable new species are based on specimens he has sent to the senior author who has had a long standing interest in the genus *Eleodes.*

Eleodes (*Caverneleodes*) *sprousei,* Triplehorn and Reddell, New Species
Fig. 1

Holotype, female: Length: 16.4 mm; width: 6.6 mm. Body elongate, slender, moderately shiny, dark brownish black.

Head subquadrate, 5/7 as long as broad, flattened; clypeal suture obsolete except laterally, epistomal margin truncate, labrum and sides of mandibles densely clothed with long, pale setae, surface sparsely and shallowly punctate, each puncture with a brownish seta, some of which (on clypeus and around eyes) are very long; eyes small, narrow, slightly reniform; antenna long, slender, basal 8 segments filiform, segments 9 and 10 moniliform, apical segment elongate and obliquely pointed, relative length of antennal segments (from base to apex): 2:1:5.5:3:3:3:3:2.5:2.5:2:3. Mentum transverse, lateral lobes fully exposed and conspicuous, median lobe with a conspicuous median longitudinal carina.

Pronotum 0.8 as long as broad, feebly convex from side to side, widest about middle, strongly narrowed in basal half, marginal bead strong and entirely visible from above; apical margin concave, angles rounded; basal margin straight, angles obtuse; surface finely, shallowly and sparsely punctured, a few long brownish setae arising from punctures laterally.

Scutellum transverse, rounded caudally, impunctate.

Elytra convex, abruptly deflexed on apical 1/6; marginal bead strong, reflexed, visible from above except about middle 1/3; surface with widely spaced, shallow punctures which are subserially arranged; lateral and apical punctures bearing long, fine, brownish setae.

Legs short, slender, conspicuously setose, all tibial spurs short and subequal, protarsus with plantar grooves on 3 basal segments interrupted by dense golden setae; meso- and metatarsus with coarser golden setae along (but not interrupting) plantar grooves.

Entire ventral surface (except epipleura) bristling with pale, brownish setae that arise

from punctures; punctures fine and sparse, somewhat muricate, except terminal abdominal segment has coarse, dense punctures on its periphery. Genital segment elongato-triangular in outline, ovipositor valve (Fig. 3) with dorsal plate elongate, convex, glabrous, appendage subapical in position, mamilliform with one long median seta and a few smaller ones on the periphery.

Allotype, male: Almost identical to female but slightly smaller and more slender; protarsus with plantar setae on 3 basal segments denser and longer; aedeagus (Figs. 4, 5) with apex very thin, deflexed, spatulate.

Variation.—The long setae of the pronotum and elytra are easily abraded. In some pinned specimens they are almost completely absent. The setae remain relatively intact on specimens preserved in fluids. Otherwise, the series is very uniform. 114 specimens examined: Length: 14.2 to 19.0 mm; width: 5.7 to 8.3 mm.

Diagnosis.—The form of the female genitalia, long, slender antennae, reduced eyes and carinate median lobe of the mentum suggest placement of this species in the subgenus *Caverneleodes* (Triplehorn 1975). It is distinct from all known members of the subgenus (and the similar subgenus *Metablapylis*) in having the plantar grooves of the basal 3 protarsal segments interrupted by compact tufts of golden setae in both sexes, but more highly developed in the male. The lateral marginal bead of the elytra is visible throughout most of its length, and the pronotum and elytra are sparsely clothed laterally and apically by long brownish setae. That combination of characters should enable easy recognition of the species.

Types.—*Holotype* (♀): Mexico, Tamaulipas, Cueva del Borrego, 0.5 km S of Conrado Castillo, 41 km NW Ciudad Victoria, 1960 m, 18 April 1982, Peter Sprouse. *Allotype* (♂): Same data. Paratypes: 8 from same locality, 25 April 1981, T. Treacy (4), 11 November 1979, P. Sprouse (2), 19 May 1980, P. Sprouse and L. Wilk (1), 25 April 1981, A. Waddington (1).

105 additional paratypes from caves in the same area: Nuevo León: Sótano de Agua de las Vacas, 1 km NNE Agua de las Vacas, 2050 m; Sótano del Café Molido, Cuauhtemoc, 2295 m; Sótano de Cañada Verde, 0.3 km E Cañada Verde, 1940 m; Sótano de las Cuisillos, 1250 m NW Agua de las Vacas, 2040 m; Pozo de las Dos Virgenes, 1400 m S Ejido Cuauhtemoc, 2240 m; Sótano de Dulces Nombres, 0.5 km E Dulces Nombres, 2010 m; Cueva de la Forja, 1 km N Chupaderos, 9 km W Dulces Nombres, 1860 m; Pozo del Futbol, Cuauhtemoc, 2240 m; Cueva Humada, Chupaderos, 9 km W Dulces Nombres, 1900 m; Pozo de Magüey Verde, 1 km NW Revilla, 2170 m; Cueva del Mono, 3 km E Garza, 8 km W Dulces Nombres, 1270 m; Cueva del Pino, San José de las Boquillas; Sótano de Sábado, 1 km SW La Escondida, 2460 m; Cueva del Soyate Viejo, 1 km NW La Escondida, 2700 m; Sótano de El Techito, 2.5 km S Ejido Cuauhtemoc, 6.5 km S Revilla, 2300 m; Sótano de los Tres Pajaritos, 1 km SSW La Escondida, 2510 m; Sótano de las Tres Ventanas, 1400 m S Cuauhtemoc, 2210 m; Sótano Triángulo, La Escondida, 2500 m; Cueva de El Viejo, 1 km SW La Escondida, 7.5 km E Zaragoza, 2550 m. Tamaulipas: Cueva de la Aprendiza, Conrado Castillo, 1930 m; Cueva del Arado, Yerbabuena, 1470 m; Cueva de los Arqitos, Yerbabuena, 1430 m; Pozo del Arrecife, 0.8 km NE Rancho Nuevo, 2655 m; Cueva del Borrego, 0.5 km S Conrado Castillo, 1960 m; Cueva la Brujita, 4 km NW Los San Pedro, 1975 m; Sótano de las Calenturas, 0.7 km S Yerbabuena, 1450 m; Cueva del Ciempies, Los San Pedro, 1520 m; Cueva de los Chirriones, 3 km NW Los San Pedro, 1810 m; Cueva de las Columnas, 1.7 km SE Revilla, 2370 m; Sima Doble, 1 km N Conrado Castillo, 2000 m; Cueva del Equinoccio, 0.5 km N Conrado Castillo, 1940 m; Cueva de la Gallina Muerta, Conrado Castillo, 1920 m;

Cueva de las Hoyas, 2 km SE La Asunción, Municipio de Jaumave; Cueva de los Insectos, Conrado Castillo, 2100 m; Cueva de la Llorona, 3.5 km SSE Yerbabuena, 1860 m; Pozo del Madroño, 0.8 km NE Rancho Nuevo, 2660 m; Cueva de la Onza, 0.5 km N Conrado Castillo, 1940 m; Cueva de las Papitas, 0.8 km SE Revilla, 2200 m; Cueva del Pedernal, 2 km N Conrado Castillo, 2120 m; Pozo del Peso, 5 km N Rancho Nuevo, 2580 m; Sistema Purificación (Sumidero de Oyamel Section), 1 km N Conrado Castillo, 1950 m; Cueva de las Quitanieves, 1 km SE Los San Pedro. 1470 m; Pozo de la Rata, 0.8 km N Rancho Nuevo, 2640 m; Cueva de Revilla, Rancho Revilla, 2310 m; Cueva de las Rojos, 2 km SE La Asunción; Pozo de las Rudistas, 0.8 km NE Rancho Nuevo, 2640 m; Cueva de la Sala Bonita, 500 m E Los San Pedro, 1460 m; Cueva de la Sangre, Los San Pedro, 1870 m; Cueva del Terminal, Los San Pedro. 1480 m; Pozo de Tinajas Prietas, 2 km NNW Caballos, 1600 m.

Holotype, allotype and paratypes deposited in United States National Museum of Natural History, Washington, D.C. Paratypes deposited in California Academy of Sciences, San Francisco, collections of The Ohio State University, Columbus, Ohio, The University of Texas, Austin and Museum of Comparative Zoology, Harvard University.

Etymology.—This species is named in honor of Peter Sprouse, who collected most of the specimens included in this study.

Biology.—This species is known only from a portion of the Sierra Madre Oriental known informally as the Purificación region. This is one of the great karst regions of the world with hundreds of caves now known and probably as many more awaiting discovery. The longest cave in Mexico, Sistema Purificación, occurs in the region. It presently contains more than 70 km of surveyed passage and attains a depth of more than 900 meters. *Eleodes sprousei* has been taken from caves at an altitudinal range of 1270 to 2700 m. It has been taken from a wide variety of caves, including largely horizontal caves and blind pits (known as sótanos in the area). Most specimens were taken in the general vicinity of entrances, but some have been found in total darkness. The abundance of the species in the caves of the area indicates that this is a troglophile, capable of reproducing in the darkness of caves but not demonstrating any morphological adaptations (such as eyelessness and depigmentation) to restrict it to the cave habitat. This part of Mexico, due to its remoteness (it is a 12 hour 4-wheel drive to reach the main karst region), is still poorly known with respect to its epigean fauna, and this species will probably be taken on the surface.

A remarkable array of cave fauna is known from this region, including a number of unusual beetles. Many of the same caves in which this species has been found are inhabited by blind carabids of the genera *Mexisphodrus* and *Mexaphaenops* and the blind leiodid *Ptomaphagus* (*Adelops*) *mckenziei* Peck. Other beetles inhabiting the caves, but not restricted to them, include staphylinids of the genera *Eustilicus, Osorius,* and *Philonthus.* The only other tenebrionid known from the caves of this area is *Mitys inflatus* Champion, which was collected in Sótano de las Calenturas in association with *Eleodes sprousei.*

Eleodes (*Caverneleodes*) *rugosifrons,* Triplehorn and Reddell

NEW SPECIES

Fig. 2

Holotype, female: Length: 18.2 mm; width: 6.2 mm. Body elongate, slender, subopaque, with very fine microsculpture, black.

Head $^{7}/_{10}$ as long as broad, widest across reflexed sides above greatly swollen sides of head above antennary orbits, deeply concave behind clypeus which is convex, de-

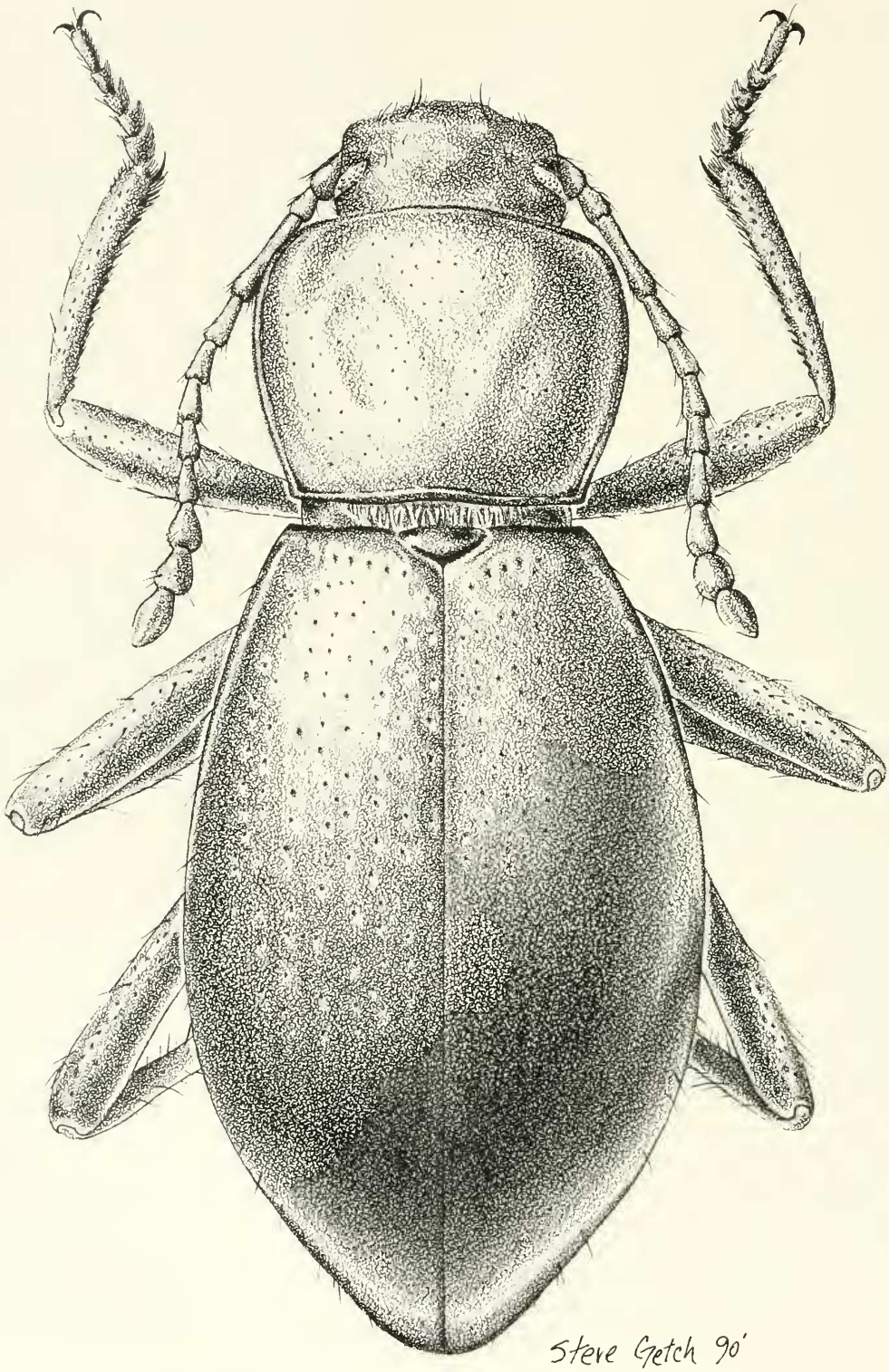


Fig. 1. *Eleodes sprousei*, female, habitus.

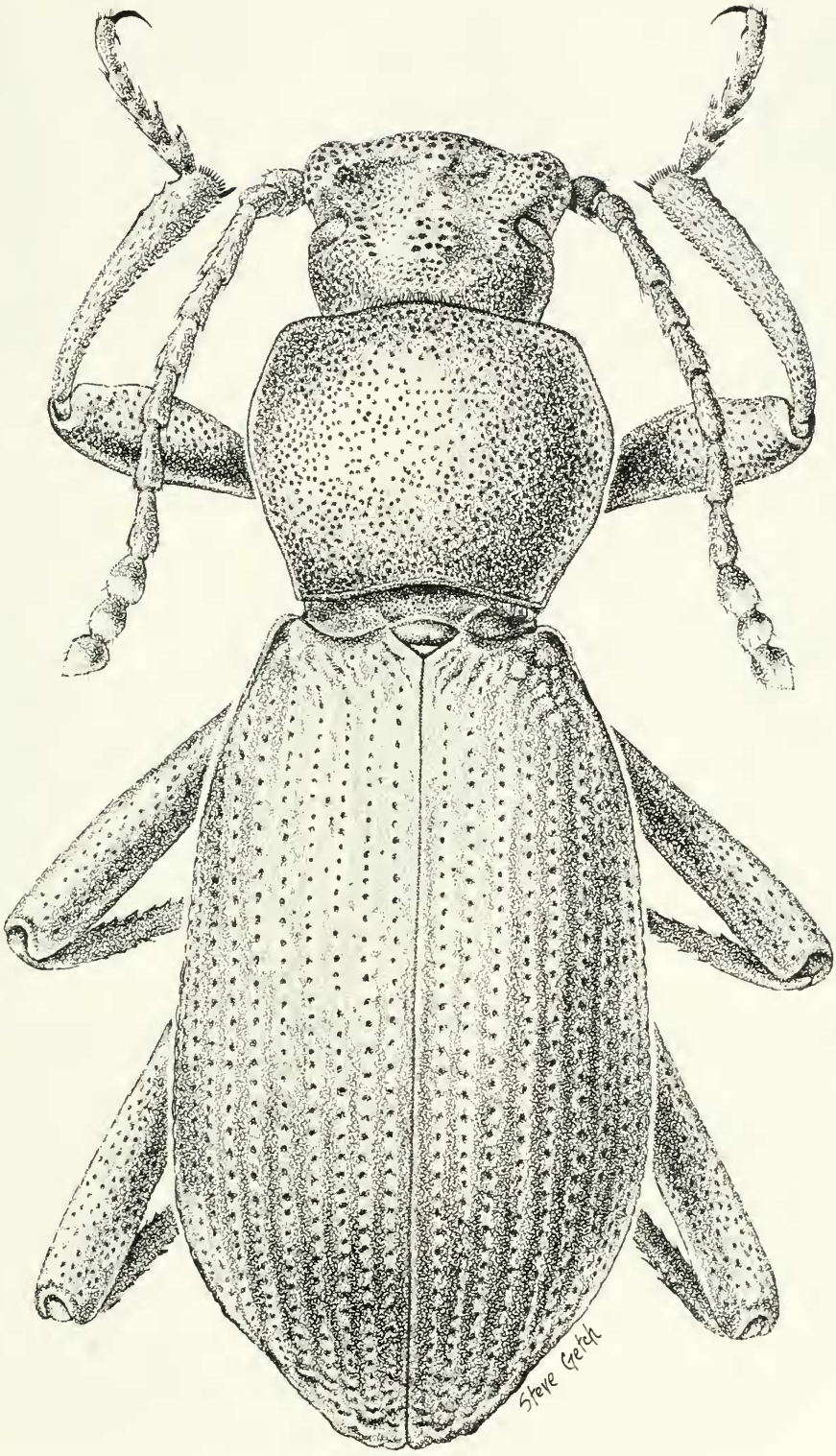
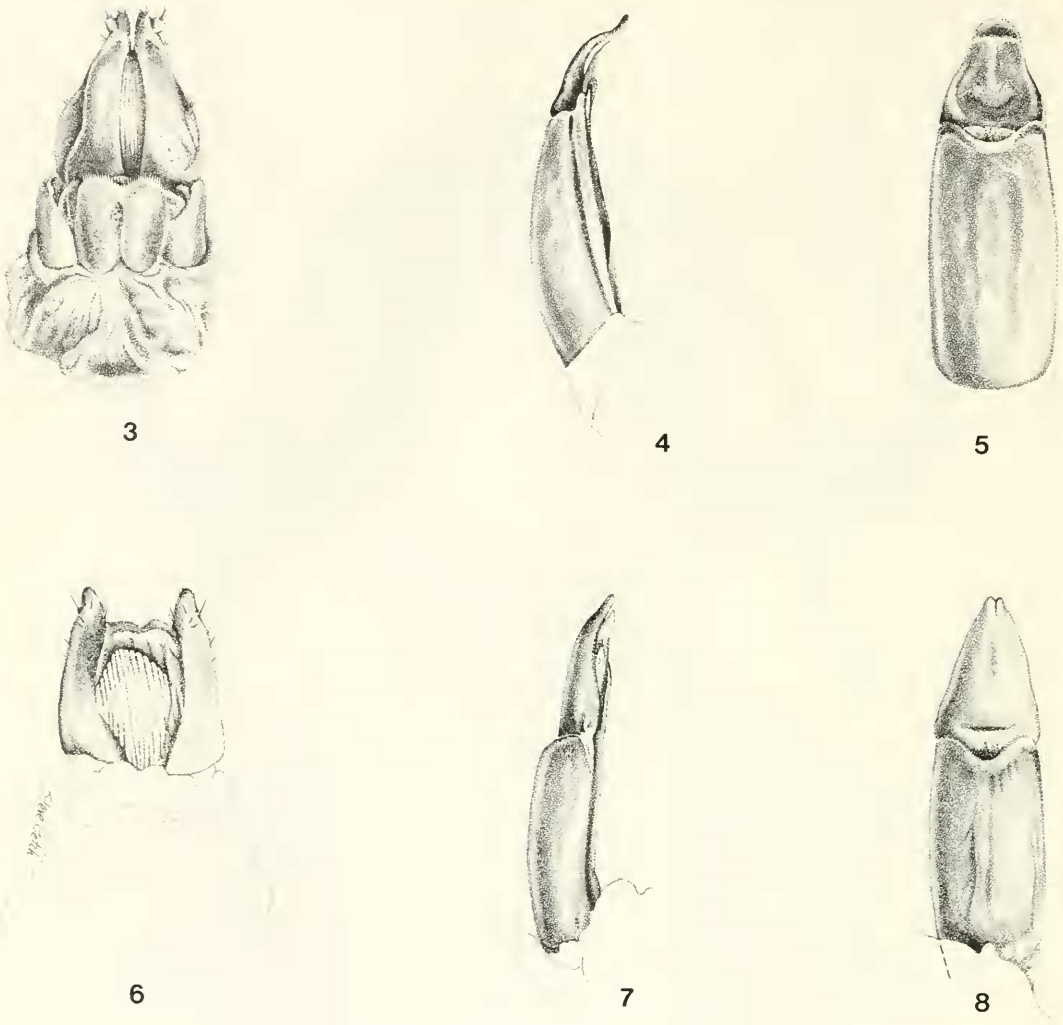


Fig. 2. *Eleodes rugosifrons,* female, habitus.



Figs. 3–8. 3. *Eleodes sprousei,* ovipositor, dorsal. 4, 5. *Eleodes sprousei,* aedeagus, lateral (4), dorsal (5). 6. *Eleodes rugosifrons,* ovipositor, dorsal. 7, 8. *Eleodes rugosifrons,* aedeagus, lateral (7), dorsal (8).

flexed anteriorly and well defined, apex subtruncate; surface coarsely and densely punctured, rugose on frontal depression; eyes small, strap-like; antenna long, slender, basal 8 segments filiform, segments 9 and 10 moniliform, terminal segment small, obliquely pointed, relative lengths of antennal segments (from base to apex): 1.5:1:4.5:2:2:2:2:2:1.5:1.3:1.5. Outer face of mandible coarsely, longitudinally rugose; mentum transverse, lateral lobes fully exposed; median lobe with a strong median longitudinal carina which is not prolonged anteriorly.

Pronotum 0.8 as long as broad, strongly convex from side to side, widest at middle, sides nearly parallel in anterior half, rapidly converging posteriorly; lateral marginal bead very fine, entirely visible from above; anterior margin truncate, angles rounded; basal margin feebly concave, angles obtuse; surface with moderately coarse, almost perfectly round, perforate punctures, most

punctures separated by less than their diameters but without tendency to coalesce.

Scutellum transverse, bluntly triangular, impunctate.

Elytra strongly convex, marginal bead visible only in basal ¼, abruptly deflexed behind, surface punctate-striate, punctures perforate and each bearing a minute pale seta; intervals with a series of smaller, more widely spaced, similarly setose punctures; sutural and two adjacent intervals becoming strongly convex on apical declivity.

Legs moderately long, slender, coarsely and densely punctured (especially tibiae), punctures minutely setose; tibial spurs all short, subequal; plantar grooves entire, bordered by short, stout brownish setae.

Entire ventral surface coarsely and densely punctured (rugose on prosternum); prosternal process horizontal, acutely prolonged; mesosternum swollen, deeply excavate, rugosely sculptured; punctures each bearing a minute pale seta. Genital segment elongato-triangular in outline, ovipositor valve (Fig. 6) with dorsal plate elongate, convex, glabrous, appendage subapical in position, extremely minute, with a single long seta.

Allotype, male: Outwardly indistinguishable from female. Length: 17.0 mm; width: 6.1 mm; aedeagus (Figs. 7, 8) simple, unmodified.

Variation.—The five specimens examined are remarkably similar, with only a slight variation in size. Length: 17.0 to 18.5 mm; width: 6.1 to 6.5 mm.

Diagnosis.—This species is placed in the subgenus *Caverneleodes* because of the form of the ovipositor, the long slender antennae, and the carinate middle lobe of the mentum. It is a radical departure from other members of the subgenus and may easily be recognized by the greatly swollen sides of the head above the antennary orbits, the concave and rugosely punctured frons and clypeus and the coarse, perforate punctures of both dorsal and ventral surfaces. The minute appendage of the ovipositor valve is likewise diagnostic.

Types.—*Holotype* (♀): Mexico, Coahuila, Cueva de los Grillos (on dry silt near entrance), 24 July 1965, J. Reddell, J. Fish. *Allotype* (♂): same data. Paratypes: Mexico, Coahuila, Pedregoso Hidden Cave, 20 mi. SE of Cuatro Ciénegas, 30 December 1969, J. Reddell, W. Russell, W. Calvert (1); same area and date, Pedregoso Circle Cave, J. Reddell, W. Russell (1); Mexico, Nuevo León, Cueva de las Cercetas, 13 km W of Bustamante (550 m), January 1989, D. McKenzie (1).

Holotype and allotype deposited in United States National Museum of Natural History: paratypes deposited in collections of The Ohio State University, Columbus, and The University of Texas, Austin.

Etymology.—The name is descriptive of the rugosely punctured front of the head.

Biology.—The caves from which this species was collected are all dry and located in desert terrain. Cueva de los Grillos is a small passage formed by the solution of a bed of gypsum in the surrounding limestone bedrock. Pedregoso Circle Cave and Pedregoso Hidden Cave are located on a cliff face and are formed in limestone. Cueva de las Cercetas is formed in a deposit of gypsum bedrock. The specimens were all taken from silt on the floor near the entrance.

Key to Known Adults of the Subgenus *Caverneleodes*[1]

1. Frons and epistoma coarsely, rugosely punctured; pronotal punctures coarse and dense (as in Fig. 2) ..... *E. rugosifrons* n. sp.
1'. Frons and epistoma finely, more sparsely (at least not rugosely) punctured; pronotal punctures fine and sparse (as in Fig. 1) 2
2. Elytra with marginal bead strongly developed at humeri and visible from dorsal view in basal ⅓ or more of elytra (as in Fig. 1) .... *E. sprousei* n. sp.

[1] There are additional species to be described so this key should be used with that in mind.

2′. Elytra with marginal bead feebly developed at humeri and not visible from above much beyond them (as in Fig. 2) 3
3. Pronotum sinuate just before base, marginal bead distinct, entirely visible from above, well defined at basal angles .. *E. easterlai* Triplehorn
3′. Pronotum not sinuate at base, marginal bead extremely fine and not entirely visible from above, basal angles obsolete 4
4. Mentum with conspicuous, anteriorly directed, finger-like process; clypeus swollen and, continuous with genae, creating a transverse concavity in fronto-clypeal area ..... *E. labialis* Triplehorn
4′. Mentum with weak median carina; clypeus not swollen, poorly defined and smoothly continuous with frons .....*E. leptoscelis* Triplehorn

Acknowledgments

We express our appreciation to Allan Cobb, Susan Lasko, Dale Pate, Peter Sprouse, and Terri Treacy for their special efforts to obtain material from caves in the Purificación area. We also thank the following cave explorers for their collecting assistance: Gerald Atkinson, Sheila Balsdon, Leslie Clarfield, Don Coons, Michael Danneborg, John Fish, David Honea, Joseph Lieberz, David McKenzie, Randy Nutt, William Russell, Mark Shumate, Peter Strickland, Allon Valient, Andy Waddington, and Lisa Wilk. We also thank Steven P. Getch, who prepared all of the illustrations and T. J. Spilman for his valuable editorial comments. This is Publication No. N.S.-24 of the Texas Memorial Museum. The senior author's research was supported by National Science Foundation research grant No. BSR-8401338.

Literature Cited

Triplehorn, C. A. 1975. A new subgenus of *Eleodes*, with three new cave-inhabiting species (Coleoptera: Tenebrionidae). Coleopterists Bulletin 29: 39–43.